

Hope is seen for a seasonal, directed New England squid fishery.

The Potential for an Offshore Squid Fishery in New England

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INTRODUCTION

The long-finned squid, *Loligo pealei*, is the common squid off southern New England, and it makes up about 90 percent or more of the total squid catch there (Summers, 1967).¹ From late spring to early fall this species is distributed over the entire continental shelf from the coastline to the shelf edge, although the greatest concentrations are on inshore grounds where spawning occurs (Rathjen, 1973; Grosslein and Bowman, 1973; Serchuk and Rathjen, 1974). In the late fall it moves to the warmer waters of the outer shelf edge and there remains until spring.

¹The remainder of the squid catch is the short-finned squid, *Illex illecebrosus*, which is more common on Georges Bank and to the northward off Canada.

Squid have been of relatively small importance to U. S. otter trawlers, due largely to the limited domestic market demand. They landed only 1,152 metric tons (2.5 million lb) in 1973, a figure which has not varied greatly during the past 10 years. The otter trawl is, however, the principal gear used to harvest squid. The U.S. catch is taken primarily during the summer and is incidental to trawl effort for fin fishes; there is essentially no directed fishery for squid.

Catch statistics published by the International Commission for the Northwest Atlantic Fisheries (ICNAF) show, on the other hand, that a number of foreign nations are actively catching large amounts of squid in this same area at present, and that their catch is increasing. The total taken by

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all countries in 1972 in ICNAF Subareas 5 and 6 was 48,565 tons (107 million lb) (Table 1, Fig. 1). This is more than double the 1971 catch (Fig. 2). Preliminary catch reports indicate that the total for 1973 was about 56,000 tons (123 million lb). Much of this catch by foreign vessels is made from late fall to spring when the squid are concentrated offshore. The Japanese, for example, fish these offshore areas from November to May (Ikeda and Nagasaki, 1973).

The total allowable catch of squid in Subareas 5 and 6 in 1974 was set by ICNAF, on the basis of stock assessment, at 71,000 tons (157 million lb). Of this, the quota allotted for the United States was 5,600 tons (12.3 million lb).

CHARTER OPERATIONS

Since the active and directed fishing for squid by foreign fleets indicates a large world demand and also the possibility of expanded domestic markets,

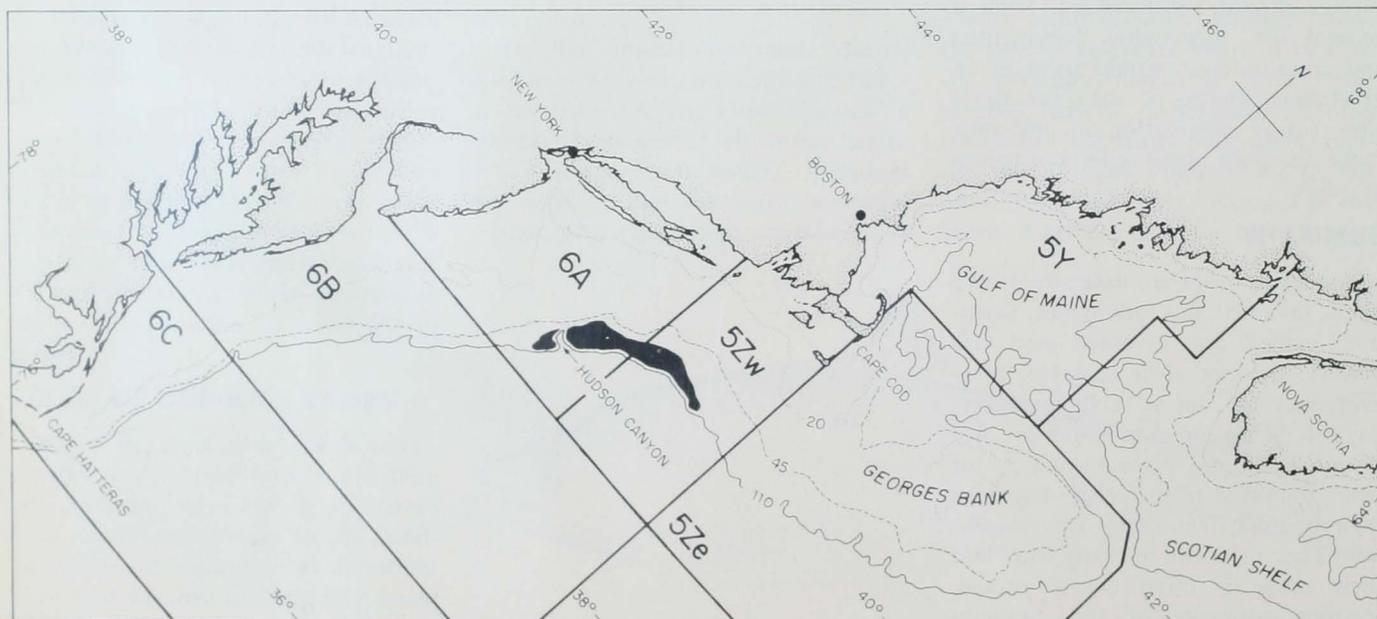


Figure 1.—Fishing areas off northeastern United States and the ICNAF statistical divisions of Subareas 5 and 6 used for reporting catch. The shaded areas northeast and southwest of Hudson Canyon were the areas fished for squid in the exploratory trips in January-February 1974. Depths are given in fathoms.

Table 1.—Reported catch of squid from Georges Bank to Cape Hatteras (ICNAF Subareas 5 and 6)¹ in 1972, by country.

Country	Catch by ICNAF Subarea					Total
	5Ze	5Zw	6A	6B	6C	
	Metric tons					
Italy	—	—	1,018	1,478	704	3,200
Japan	6,693	1,169	4,079	5,835	915	18,691
Poland	4,941	101	313	69	4	5,428
Spain	3,912	1,885	638	2,248	3,177	11,860
USA	7	407	286	306	146	1,152
USSR	5,469	832	410	169	16	6,896
Others ²	441	129	432	324	12	1,338
Total	21,463	4,523	7,176	10,429	4,974	48,565

¹ The reported squid catch in Subarea 5Y (Gulf of Maine) was only 125 tons (0.3 million lb) in 1972. Catch per tow in trawl surveys also is low there (Grosslein and Bowman, 1973).

² Includes Bulgaria, Cuba, France, Romania, and West Germany.

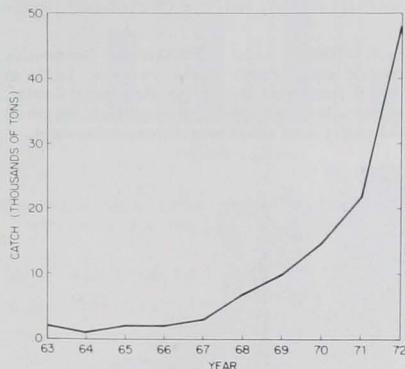


Figure 2.—Reported catch of squid by all countries in ICNAF Subareas 5 and 6 in 1963-72, in metric tons. Source: ICNAF Statistical Bulletin, Vol. 22 (for the year 1972).

the National Marine Fisheries Service² in 1973 began looking into means of generating incentive for a larger U.S. squid fishery. Because most of the foreign catch is with otter trawls on offshore concentrations in fall and winter, the Service chartered a trawler for four trips, about 1 week each, in January-February 1974 to test the feasibility of directed squid fishing at that time. This report summarizes the results of those trips.

A commercial stern trawler, the *Valkyrie*, of New Bedford, Mass., 30 m (99 feet) long and 700 hp, was chartered for the work (Fig. 3). Two styles of otter trawls were used. One of these was a No. 41 Yankee trawl modified to a 4-seam, high-opening net and hung on a 21.6 m (71-foot) headrope and 29 m (94.5-foot) footrope. The mesh size, stretched mea-

²The work was carried out under the New England Fisheries Development Program, a Government-Fishing Industry cooperative effort.

sure, was 114 mm (4.5 inches) in the codend and 127 mm (5 inches) forward of the codend. The other net was a 2-seam Yankee-style trawl, also modified for high opening, with a 21.3 m (70-foot) headrope and 27.4 m (90-foot) footrope. It had a 51 mm (2-inch) mesh body and a 127 mm (5-inch) mesh codend. Codend liners, 13 to 51 mm mesh, were used in both trawls. No time was available for an accurate comparison of these trawls during the charter trips, and about all that may presently be said is that they caught squid in relatively good, and about equal, amounts. Average catch per unit of effort for both trawls combined is given later in this report.

Tows were of 2 hours duration at a towing speed of 3.5 knots. Operations were carried out around the clock.

The area over which fishing was tried, along the shelf edge on both sides of Hudson Canyon, is shown in Figure 1. Water depth there ranged from 91-165 m (50-90 fm), with most tows being made in 119-146 m (65-80 fm). The bottom temperature ranged from 56-60°F and averaged about 57-58°F for all trips combined. Since the winter of 1973-74 was a mild one, this is higher than the 46-52°F usually found there in the winter (Walford and Wicklund, 1968; Colton and Stoddard, 1973).

CATCH VALUE

Squid with mantle lengths of less than 14 cm (5.5 inches) were considered small market size; those 14 cm and over were large. The size separation was done on board and the squid were iced whole. An estimated 1 percent or less of the squid catch was short-finned squid. Some of the incidental catch of finfish, including summer flounder, butterfish, and tilefish, also was saved and marketed.

The landed catches for each of the 4 trips (Table 2) show that about 80 percent was squid. The ex-vessel prices received per pound were 10 cents for small squid and 20 cents for large. The average price for all

Figure 3.—The stern trawler, *Valkyrie*, 99 feet long and 700 hp, used for the squid charter trips.



Table 2.—Landed catch and ex-vessel value for squid charter trips in January-February 1974.

Trip number	Dates	Number of tows	Landed catch		Catch value
			Squid	Finfish ¹	
			Pounds	Dollars	
1	8-13 Jan 1974	52	37,500	1,975	6,670
2	18-24 Jan 1974	60	50,200	6,760	8,508
3	29 Jan-4 Feb 1974	55	41,750	3,640	7,416
4	10-15 Feb 1974	51	39,625	3,950	7,206
Total		218	169,075	16,325	29,800

¹ The landed finfish consisted of butterfish (39 percent), summer flounder (28 percent), tilefish (28 percent), goosefish (4 percent), and scup (1 percent).

squid landed was 15.5 cents. The incidental fish catch was about 12 percent of the gross trip value and averaged 22 cents per pound, ex-vessel.

The price for squid was much less than the 40 cents per pound or more sometimes received for the small quantities of large squid landed in the summer and sold fresh in domestic markets. The principal reason for the low prices appeared to be that the market was not geared to absorb the large catches at the time of the charter trips. This is related to the considerable market resistance on the part of the U.S. consumer, who is slow to try nontraditional seafoods. Incidentally, quality tests of the squid from the charter trips indicated that they kept well in ice (Fig. 4).

The best area for fishing in all four trips was found to be on the southwestern edge of Hudson Canyon in about 119-146 m (65-80 fm) (Fig. 1). Catches here varied from about 32-1,900 kg (70-4,200 lb) per tow. To the northeast of Hudson Canyon, catches ranged from 16-725 kg (35-1,600 lb) per tow. For all trips combined, the average catch per hour of towing time was 234 kg (517 lb) southwest of Hudson Canyon, where about 65 percent of the fishing was done, and 88 kg (193 lb) northeast of there. In view of the large catch by foreign vessels on the outer shelf, it is likely that there were other concentrations of squid such as that found southwest of Hudson Canyon. Limited time, however, ruled out extensive scouting.

DAY-NIGHT DIFFERENCES

As is well known, squid are most likely to be near the bottom, and catchable with bottom trawls, during daylight. For the experimental trips we have therefore summarized catch per hour by six-hour time periods:

2400-0600 hours, 0600-1200, 1200-1800, and 1800-2400 (Fig. 5). The period 0600-1800 hours covered the daylight period. As the graphs show, catches were consistently better during daylight, with the best catches, about 340 kg (750 lb) per hour, being ob-

tained in the afternoon (1200-1800 hours). For all trips and all areas combined, about 65 percent of the squid catch was made during daylight.

Random samples of the squid catches were measured from most daylight tows and from some night tows to define the size composition. The sizes ranged from 4 to 32 cm mantle length (Fig. 6). Since the squid trips were experimental in nature, several mesh sizes were tried in the codend liner. During trip 1 a 13 mm (½-inch) mesh liner (stretched mea-

Figure 4.—NMFS food technologist examines the landed squid catch of the *Valkyrie*. Tests at the NMFS Northeast Utilization Research Center, Gloucester, Massachusetts showed that the shelf life of heavily iced squid was at least nine days.



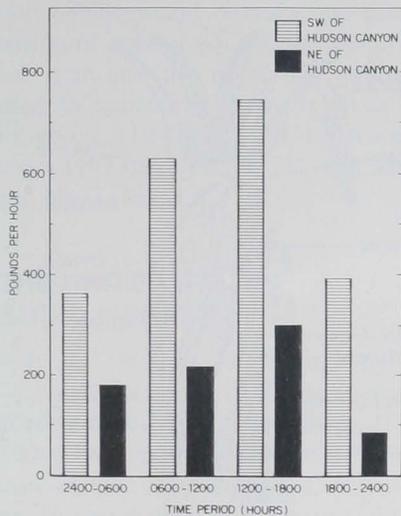


Figure 5.—Squid catch per hour's fishing in relation to time of day (eastern standard time).

sure) was used in the codend, and this presumably retained all sizes of squid entering the trawl. The size distribution for this trip indicates that there are modes at about 7-8 cm and 11-13 cm mantle length. These possibly represent two age groups, but growth data presently available are insufficient to clearly define age (Summers, 1971). Mesh sizes for trip 2 were 13, 32, and 51 mm ($\frac{1}{2}$, $\frac{1}{4}$, and 2 inches), each used roughly equal time; for trip 3, mesh sizes were 32 and 51 mm, also used about equal time; and for trip 4 mesh size was exclusively 51 mm. The size frequencies show that there was some escapement of small squid, and therefore a higher average size retained by the net, when a 51 mm liner was used (Fig. 6). The data, however, are inadequate for defining a mesh selection curve. They demonstrate, nevertheless, that some of the small, immature squid, for which there is

limited market demand, can be eliminated from the catch through the use of larger mesh gear, probably larger than 51 mm. Using a larger mesh also would reduce the amount of small, unmarketable fish caught, such as little butterfish, and would cut ship-board sorting time.

ECONOMIC FEASIBILITY

The ex-vessel value of the squid and incidental fish catch in the four charter trips amounted to \$29,800, or about \$1,250 per 24-hour fishing day. Vessels similar to the *Valkyrie* were grossing about \$1,500-\$3,000 per day on groundfish (cod, haddock, and associated species) at this same time. Fishing for these traditional species therefore was clearly more attractive to fishermen than fishing for squid. With a slightly increased catch rate for squid and a better price, however, a directed fishery for squid offshore could become a reality, at least on a seasonal basis.

In assisting in the development of such a directed fishery it would be useful to: 1. consider the possibility of freezing catches at sea, as is done on foreign vessels to insure highest quality and price; 2. improve trawl gear for squid; and 3. investigate the sonic detection of squid.

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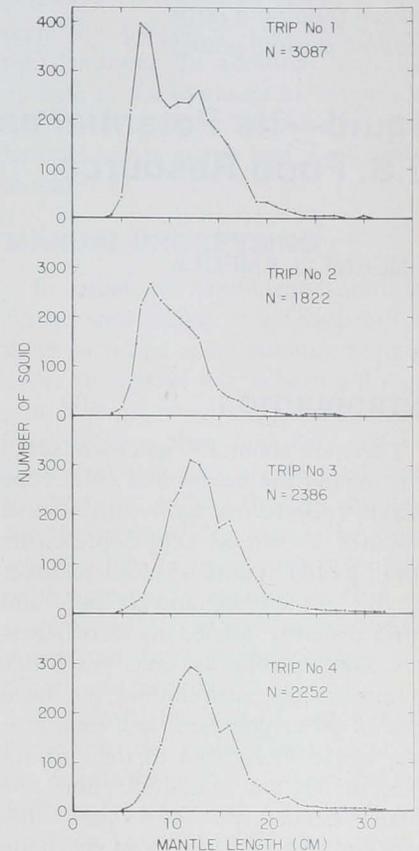


Figure 6.—Size frequencies of squid, *Loligo pealei*, measured during the January-February 1974 charter trips. (N is the number measured. See text for the codend mesh size for each trip).

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